Contribution ID: **10**   Type: **not specified**

The box-ball system with random initial conditions and Pitman's transformation

Friday, September 13, 2019 11:10 AM (20 minutes)

The box-ball system(BBS), introduced by Takahashi and Satsuma, is a cellular automaton that exhibits solitonic behaviour. We show that the BBS dynamics can be described by using the transformation of a nearest neighbour path encoding of the particle configuration given by 'reflection in the past maximum', which is known as Pitman's transformation. The techniques developed to understand the deterministic dynamics are subsequently applied to study the evolution of the BBS from a random initial configuration.

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